Note on some Values of the Sun's Mean Horizontal Parallax which have been deduced from the Transit of Venus Observations made in 1882. By E. J. Stone, M.A., F.R.S., *Radcliffe Observer.*

The recent publication by Professors Harkness and Auwers of the results obtained by them from the Photographic and Heliometer Observations of the Transit of *Venus*, 1882, has suggested to me the desirability of recalling attention to the results obtained, 1887, from a discussion of the contact observations of the Transit of *Venus* which were made in co-operation with the expeditions sent out by the British Government.

If $d\alpha^s$ and $d\Delta''$ denote the relative corrections, in right ascension and north polar distance respectively, which are required by Le Verrier's Tables of *Venus* and the Sun for the time of the transit, the values of the mean horizontal equatorial parallax π, which I found from the "Internal Contacts," were expressed under the forms

Ingress Observations:

$$\pi = 8''{\cdot}823 \pm 0{\cdot}033 + 0{\cdot}065 \,.\, d\alpha^s - 0{\cdot}0027 \,.\, d\Delta''.$$

Egress Observations:

$$\pi = 8''{\cdot}855 \pm 0{\cdot}036 - 0{\cdot}068 \,.\, d\alpha^s - 0{\cdot}0099 \,.\, d\Delta'',$$

or, combining the results,

$$\pi = 8''{\cdot}839 \pm 0{\cdot}024 - 0{\cdot}0015 \,.\, d\alpha^s - 0{\cdot}0063 \,.\, d\Delta''.$$

The resulting values of π in these equations are slightly affected by any existing errors $d\alpha^s$ and $d\Delta''$.

The Photographic and Heliometer Observations should afford special facilities for the determination of such relative corrections as $d\alpha^s$ and $d\Delta''$, and the results obtained by Professors Harkness and Auwers for these quantities are in close agreement.

If we adopt the values found by Professor Auwers, viz.:

$$d\alpha^s \doteq \frac{9''{\cdot}13}{15},\ d\Delta'' = -1''{\cdot}99,$$

the value of π given by the Internal Contacts becomes

$$\pi = 8''{\cdot}850 \pm 0''{\cdot}024.$$

The results obtained by Professors Harkness and Auwers are respectively:

$$\pi = 8'{\cdot}842 \pm 0{\cdot}011$$

$$\pi = 8''{\cdot}883 \pm 0{\cdot}022,$$

which agree in a very satisfactory manner with that which I have found from the Internal Contacts, viz.:

$$\pi = 8''{\cdot}850 \pm 0{\cdot}022.$$

The results given by the other contacts observed in 1882 agree within the probable errors of their determinations with those obtained from the Internal Contacts.

On the Relation between Diameter of Image, Duration of Exposure, and Brightness of Objects in Photographs of Stars taken at the Royal Observatory, Greenwich. By W. H. M. Christie, M.A., F.R.S., Astronomer Royal.

Since the 13-inch photographic equatoreal was mounted and brought into working order, a number of experimental photographs have been taken at Greenwich with a view to determining the increase of diameter of star disc with exposure, and the relation between the brightness of a star and the exposure required to photograph it. Thanks to the fine definition and excellent clock-work of Sir Howard Grubb's instrument, the star images on these photographs are as a rule remarkably sharp, and very small measurable discs have been obtained in the case of faint stars.

Photographs of selected regions, for which Professor Pritchard has determined with the wedge photometer the magnitudes of certain stars of 9th and 11th magnitude, have been taken with a graduated series of exposures, and the diameters of the star discs on certain of these photographs have been measured under a microscope with a filar micrometer. The microscope has a magnifying power of about 15, referred to a distance of 10 inches. The star discs measured were scattered over the field up to a distance of 60′ from the centre, the plates being placed about 1^{mm} within the focus for the centre, *i.e.* focussed on a point about 52′ from the centre, so as to equalise the definition over the field.

I.—*The Relation between Diameter of Image and Duration of Exposure.*

Two distinct formulæ have been proposed to express this relation, both of which are, from the nature of the case, empirical:—

1. The diameter varies as a power of the exposure, *i.e.*,

$$\frac{d}{d_0} = \left(\frac{t}{t_0}\right)^p \quad \text{or} \quad \log d - \log d_0 = p\,(\log t - \log t_0)$$

where d, d_0 are the diameters of the images of the same star corresponding to exposures of t^s and t^s_0 respectively under similar